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FORMATION AND CHARACTERISTICS OF STORM-GENERATED EVENT BEDS ON THE CONTINENTAL SHELF: EVIDENCE FROM SHELF TRANSPORT MODELS

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LONG-TERM GOAL

My long-term objective within the STRATAFORM program is to investigate the processes forming fine-scale stratigraphy on the continental shelf on time scales from single events to hundreds of year and to develop, test, and apply shelf sediment transport models incorporating the important processes to predict event bed stratigraphy on these time scales.

OBJECTIVES

The objectives of this project for FY97 and FY98 are to 1) participate in the analysis and interpretation of the bottom boundary layer field studies; 2) develop a 2-dimensional, time-dependent model to investigate the importance of flux divergence to event bed formation and the emplacement of flood deposits; 3) evaluate the relative effects of floods and storm resuspension on near-bed suspended concentrations and fluxes; 4) estimate shelf to slope sediment flux on the Eel shelf; 5) incorporate flocculation effects into the shelf sediment transport model.

APPROACH

My approach combines development and application of one- and two-dimensional shelf transport models with data analysis. Over short time scales (deployments), this approach provides a means to extend field measurements in the vertical and horizontal dimensions. Over longer time scales (decades to a hundred years), this approach allows estimation of sediment flux, depositional patterns, and event bed characteristics (e.g., thickness, grading) on the shelf.

WORK COMPLETED

During FY97, I participated in the analysis of the 1995-96 Geoprobe data from S50 (Cacchione et al., in review); used the 1996 S60 data to estimate off-shelf sediment flux; used the 1995-96 S60 and K50 data and 1996-97 S60 and K60 to examine the effect of floods on near-bed suspended concentrations; and helped to lead a workshop at Woods Hole on flood sedimentation on the Eel shelf (article in preparation for EOS). Courtney Harris completed development of her 2-dimensional, time-dependent shelf transport model and is currently completing a series of model runs for the Eel shelf identifying the contribution of net erosion and deposition to event bed formation; the results will be presented at the 1997 Ocean Sciences meeting.

RESULTS

Net cross-shelf bottom boundary layer flow and sediment flux were directed offshore at S60, S50, and K60 during Sep 1995 - Feb 1997 (the period of record). Strong northward alongshelf flow and sediment flux occurred at S50 during storms; as the storm systems passed, surface winds reversed and bottom currents and sediment flux became southward; cross-shelf flow and transport were offshore. Observed changes in bottom ripple patterns at S50 were related to periods of high combined bottom stress. Analysis of wave and wind conditions during floods showed that floods larger than 2000 m^3/s are associated with high waves and northward winds. Analysis of the 1995-96 winter data from S60 indicates that near-bed suspended concentration does not appear to be significantly affected by Eel River discharge events of 2500 m^3/s or smaller. At S50, the 1995-96 winter data indicate that resuspension threshold was lower and the clearing rate of suspended sediment was slower during Eel River floods > 2000 m^3/s than during lower flow conditions, suggesting the ephemeral presence of fine, easily mobilized flood-derived sediment. Estimates of cross-shelf sediment flux from the shelf to the slope were made for the S-transect based on 1996 S60 currents and NDBC

wave conditions for a depth of 120 m. Poleward and equatorward flux during 1996 were nearly equal, but cross-shelf flux was strongly offshore. Resulting flux estimates for 1996 at S120 are 5.4 kg per meter offshore and 0.7 kg/m poleward; calculated fluxes at S60 are about 3 times higher. Compared to other years in the NDBC wave record (1982 - present), 1996 was an average wave year with 2-year return period peak wave conditions.

IMPACT/APPLICATIONS

The analysis of measured sediment flux near the bed and calculations of depth-integrated sediment flux in the bottom boundary layer provide critical information for sediment input to the Eel continental slope and the short and long-term sediment budget of the Eel margin. Essential to understanding shelf sedimentation and sediment dynamics is determining the relative effects of floods and storms on sediment flux and event bed formation. The results indicate that small floods have negligible effect on fluxes, but that increased suspended load during and following large floods, such as the Jan 1997 flood, completely dominates the turbidity signal.

TRANSITIONS

We are providing shelf-to-slope sediment flux estimates to investigators in the STRATAFORM slope group. We have had discussions with James Syvitski about providing a version of our 2-dimensional shelf transport model to his SedFlux model. A plan has also been formulated among the shelf modelers to provide the inputs necessary to characterize shelf transport in the long-term margin evolution models. Our NDBC climate and wave data are available to other STRATAFORM investigators on request.

REFERENCES/FY97 PUBLICATIONS

Cacchione, D.A. and P.L. Wiberg, J.F. Lynch, J.D. Irish, and P. Traykowski, in review. Estimates of suspended-sediment flux and bedform activity on the inner shelf off northern California during STRATAFORM, *Marine Geology*.

Harris, C.K. and P.L. Wiberg, 1997. Approaches to quantifying long-term continental shelf sediment transport with an example from the northern California STRESS mid-shelf site. *Continental Shelf Research*, 17 (11), 1389-1418, 1997.

Lynch, J.F., J.D. Irish, T.F. Gross, P.L. Wiberg, A.E. Newhall, P.A. Traykowski, and J.D. Warren. Acoustic measurements of the spatial and temporal structure of the near-bottom boundary layer in the 1990-91 STRESS experiment. *Continental Shelf Research*, 17 (10), 1271-1295, 1997.